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## A LOGICAL ANALYSIS OF SELECTED TEXTS IN NYANJA

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**ABSTRACT** In this study, formal and informal principles of logic were applied to selected texts written in Nyanja, an African language spoken primarily in Eastern Zambia. The investigation was corpus-based and considered five text types or genres of discourse: everyday conversations, novels, oral narratives, plays, and proverbs. In total, 545 syllogisms were formalized and categorized according to syllogism type. The analysis then identified patterns of logic used within various text types and in the entire dataset. The findings for each genre and for all genres as a collective corpus are discussed in this paper. One of the major conclusions of the study was that humans use an abbreviated system of logic in actual practice. No syllogism was found to be used in its entirety, from premises to conclusion. This analysis also found that 80% of free communication or conversation was in the form of conclusions, which are the end products of the syllogism process.

**Key Words:** Eastern Zambia; Logic; Nyanja texts; Premise; Syllogism.

### INTRODUCTION

In this study, principles of logic were applied in the analysis of selected texts written in Nyanja. Although many studies have used logic in linguistic analysis for more than a century, most have been conducted in European countries; additionally, a few have been undertaken in Asia, specifically in China and India. Apart from some studies of African rhetoric, little attempt has been made to apply the principles of logic to African languages. This research thus aimed to contribute to the fields of applied logic and semantics in African languages by applying the principles of logic to the analysis of the Nyanja language in Zambia.

Although no language or speech community called ‘Nyanja’ actually exists, the term refers to a language spoken in the Eastern Province of Zambia. The language known as Nyanja, also referred to as ‘Cinyanja’ or ‘Chinyanja,’ is Chewa (Cicewa), the native language of the Chewa people of Katete District whose Paramount Chief is Gawa Undi. In this paper, ‘Nyanja’ is used as a synonym of ‘Chewa’ and does not include the language referred to as ‘Nyanja’ in the capital city of Lusaka. Some individuals in Lusaka speak a *lingua franca* form that contains a considerable amount of Chewa vocabulary and is called ‘Cinyanja.’ Nyanja (Chewa) is also spoken in other districts of Eastern Province, including those adjacent to Katete (Mambwe, Chipata, Petauke, Lundazi, and Chadidza), and in countries bordering Zambia, particularly Malawi and Mozambique.

According to Guthrie’s (1948) classification of Bantu languages, Nyanja falls under Zone N, which is comprised of four groups (10, 20, 30, and 40). Nyanja is dialect cluster N31 of Group 30 and is comprised of three dialects: Nyanja (N31a), Cewa (N31b), and Manganja (N31c). The Nyanja analyzed in this study

is 'Cewa', a combination of Nyanja (N31a) and Chewa (N31b).

Logic has been one of the most intriguing and significant areas of scholarly investigation for centuries. Since the time of the great philosopher Aristotle, logic has been acknowledged as a component of general education. Aristotle believed that scholars should receive training in logic before embarking on the study of any social or natural science (Encyclopaedia Britannica, 1981: Vol. 11). Logic is currently taught at many universities and is a compulsory subject in many educational programs. To better understand the function of one's native language, the study of logic is as helpful as that of Latin grammar, upon which most linguistic thinking has traditionally been based. Most studies in logic, however, have been in the field of philosophy, where the subject has been explored widely. Although Plato and Aristotle undertook some studies that related logic almost directly to linguistics, the influence of logic on linguistics has been investigated in detail only since the beginning of the 20<sup>th</sup> century. Much more research that applies logic to the study of linguistics is necessary.

## METHODOLOGY

General logic theory informed the research presented here, which investigated the function of logic in Nyanja. To ensure the representativeness of the findings, the analysis included different genres of discourse: typical conversations, oral narratives, a novel, a play, and proverbs. This study design was based on the hypothesis that different genres would exhibit different types of reasoning and argument structures. To observe the logical system, data from these genres were collected and analyzed by genre, and the findings were then compared among genres.

Given the diversity of the discourse genres investigated, data collection was carried out using a triangulation of methods. Typical conversations, oral narratives, and proverbs were collected by participant observation and from written sources. One novel and one play were selected and read before identifying logical data. The following written sources were used: Zulu's (1961) novel *Zomfula Mkazi Wacimaso-maso* [Zomfula, a promiscuous woman]; Chiwona's (1989) play *Pali Imfa Pali Mabvuto* [Where there is death there are problems]; Wendland's (2004) *Poceza M'madzulo* [Chatting time in the evening], a collection of oral narratives; Kamanga's (1949) *Nzeru Zakale* [Old wisdom], a collection of proverbs; and Chakanza's (2000) *Wisdom of the People*, another collection of proverbs.

Logical data are presented using formal language; such data were required for the final analysis. Thus, data that used ordinary language were changed to formal language by crafting or formalizing arguments or syllogisms based on the original text. The logical analysis was undertaken using the following steps: (1) Nyanja texts thought to be eligible for logical analysis were collected; (2) all data were translated into English; (3) arguments were crafted or formalized from texts that used ordinary language [Wallace (1977) outlined a similar process]; (4) valid and invalid arguments were identified; (5) types of crafted or formalized syllogisms were identified; (6) reasons for the use of logic in the manner observed in the Nyanja texts were explored by genre and as a whole; and (7) specific conclusions

for particular texts and general conclusions for all texts were drawn, based on the results of step 6.

The analysis consisted of two major components. First, the manner of argument presentation in the various discourse genres was explored. Second, the study sought to identify the types of arguments present in the data collected. A three-category parameter was developed to achieve these two goals.

## I. Major Syllogism Types

The first category, called major syllogism types, was designed to identify *modus ponendo ponens* (MPP), *modus tollendo tollens* (MTT), and hypothetical syllogisms. Each of these major argument types encompasses several subdivisions. MPP and MTT argument patterns are illustrated in examples (2) and (4), respectively.

In this paper, ‘syllogism’ and ‘argument’ are used synonymously. A syllogism is a set of three propositions: a major premise, a minor premise, and a conclusion inferred from the two premises (Allwood et al., 1977). Example 1 illustrates the structure of a syllogism.

- |  |               |
|--|---------------|
| (1) 1. Zambians are Africans,                      |               |
| i.e., if someone is Zambian, then s/he is African. | Major premise |
| 2. Phiri is a Zambian.                             | Minor premise |
| 3. Thus, Phiri is an African.                      | Conclusion    |

### 1. *Modus Ponendo Ponens* (MPP)

MPP, which literally means ‘the way that affirms by affirming’ in Latin, is a rule that governs conditional propositions or, simply, conditionals. A conditional is a valid argument that is formalized as in example (2), using lowercase letters (from *p* onward) as variables for propositions.

- (2) 1. If *p*, then *q*, or  $p \rightarrow q$ .  
       2. *p*.  
       3. Thus, *q*.

Because *p* is the antecedent and *q* is the consequent, the proposition  $p \rightarrow q$  requires the use of assumption (example (3)).

- (3) 1. If a machine is on, then there will be noise.  
       2. The machine is on.  
       3. Thus, there will be noise.

### 2. *Modus Tollendo Tollens* (MTT)

MTT, which means ‘the way that denies by denying’ in Latin, governs conditionals (as does MPP) as well as valid arguments. Example (4) illustrates the formalization of an argument and example (5) is an MTT.

- (4) 1. If  $p$ , then  $q$ , or  $p \rightarrow q$ .  
 2. Not  $q$ .  
 3. Thus, not  $p$ .
- (5) 1. If a machine is on, then there is noise.  
 2. There is no noise.  
 3. Thus, the machine is not on.

### 3. Hypothetical Syllogism

This argument type also governs valid arguments and conditional statements. It is called 'hypothetical' because it involves conditionals. Although MPP and MTT were formerly classified as hypothetical because they involved conditionals, they are no longer. In a hypothetical syllogism, the conclusion is also a conditional statement. Example (6) is a hypothetical syllogism and example (7) shows the formalization of the syllogism.

- (6) 1. If  $p$ , then  $q$ , or  $p \rightarrow q$ .  
 2. If  $q$ , then  $r$ , or  $q \rightarrow r$ .  
 3. Thus, if  $p$ , then  $r$ , or  $p \rightarrow r$ .
- (7) 1. If there is poverty, then there is no money.  
 2. If there is no money, then there is no revenue.  
 3. Thus, if there is poverty, then there is no revenue.

## II. Syllogism Content

The second category, called syllogism content, was used to identify the form (major premise, minor premise, conclusion, and/or context) in which each argument was presented. Some texts lacked explicit statements that could be classified as major or minor premises or conclusions, requiring these forms to be inferred contextually. Example (8) shows an argument presented simply as a conclusion.

- (8) One day a driver is invited for lunch at his boss's home. At the table, the boss asks the driver to wash first, but he refuses. The boss insists that the driver washes first. In this situation, we can formalize two syllogisms from the hypothesized perspectives of the boss and the driver:
- (a) Boss: Please wash your hands.
- |   |               |
|---|---------------|
| 1. A guest should be given preference in one's home.    | Major Premise |
| 2. My employee is my guest today.                       | Minor Premise |
| 3. Thus, he should be given preference in hand-washing. | Conclusion    |
- (b) Driver: No sir, you first.
- |  |               |
|--|---------------|
| 1. A boss should be given preference at all times. | Major premise |
| 2. We need to wash our hands.                      | Minor premise |
| 3. Thus, the boss must wash his hands first.       | Conclusion    |

The boss and driver give each other preference using merely the conclusion

statements, without detailing the reasons for their chosen manners of acting. Their arguments are presented merely as conclusions. This abbreviated pattern is a common way of thinking and communicating in everyday conversations.

The categories of context and major premise are best regarded as a single category because they function nearly identically. Conclusions may be drawn from the context of a conversation, just as they can from the major premise. Because the thinking process is abbreviated, participants seek to reduce the risk of errors (or communication breakdown) by providing sufficient and appropriate information. Thus, a minor premise can be used to initiate an argument only if it has a lower risk of causing error or if it is likely to allow the listener or audience to readily craft the desired syllogism. In example (9), a politician presents his argument as a minor premise.

(9) In a televised interview, a politician accused of murder states, “I cannot even kill a chicken, because I am a vegetarian.” The politician’s argument can be formalized as follows:

- |   |               |
|---|---------------|
| 1. One who cannot kill a chicken cannot kill<br>anything larger than the chicken. | Major Premise |
| 2. I cannot kill a chicken.   | Minor Premise |
| 3. Thus, I cannot kill a human being.   | Conclusion    |

The politician simply used a minor premise, requiring the journalist and audience to deduce the remaining components of the argument.

### III. Assessment of Syllogisms

The third category, assessment of syllogisms, was used to investigate types of argument that did not fall under the major syllogism types. These included valid and sound, valid but unsound, uncogent but strong, cogent but weak, MPP fallacy, and MTT fallacy arguments.

#### 1. MPP Fallacy

An MPP fallacy is a misapplication of the MPP syllogism, as illustrated in example (10).

(10) People blamed the coach for the poor performance of the Zambian National Soccer Team. The people’s argument is formalized as follows:

- |                                     |               |
|-------------------------------------|---------------|
| 1. A bad coach makes his team lose. | Major Premise |
| 2. The team has lost.               | Minor Premise |
| 3. Thus, the coach is bad.          | Conclusion    |

The major premise is comprised of two propositions: the antecedent ( $p$ ) ‘a bad coach’ and the consequent ( $q$ ) ‘his team loses.’ An MPP fallacy is a logical error that is realized by affirming the antecedent. A true MPP would be formalized as in example (2) using the rule of assumption; example (11) shows the formalization of this syllogism.

- (11) If  $p$  = If there is a bad coach, then  $q$  = then his team will lose.  
 We assume  $p$  = there is a bad coach.  
 Therefore,  $q$  = his team will lose.

However, the speaker in the second part of this argument reaffirms the antecedent (minor premise: the team has lost) and consequently draws the wrong conclusion (the coach is bad). The team's loss may have had nothing to do with the quality of the coach. Although this is a logical error, it remains highly probable that the loss could be attributed to the bad coach.

## 2. MTT Fallacy

AN MTT fallacy is the misapplication of an MTT syllogism, illustrated in example (12).

- (12) A man comes home from work earlier than usual to find that his wife is not home. When he calls her, she says that she is at a friend's home. However, she had said previously that she would go to church if she went out.
1. My wife said she would go to church.
  2. She is not at church.
  3. So, she is cheating.

This is called an MTT fallacy because the syllogism looks like an MTT but lacks a valid format. It is a fallacy or error because the fact that the wife is not at church does not mean that she is cheating. She could have been at the friend's home for various other good reasons.

## 3. Valid and Sound Syllogisms

An argument is valid when all of its premises support the conclusion completely (Layman, 2002). If all of the premises are true, then the conclusion must be true. An argument is invalid when the conclusion is not necessarily true, even when all the premises are true. When all of the premises of a valid argument are true, it is called a sound argument and will always have a true conclusion. An unsound argument can be realized in any of the following three situations: (a) when an argument is valid but has at least one false premise, (b) when an argument is invalid but all premises are true, or (c) when an argument is invalid and has at least one false premise.

Example (14) illustrates the construction of a valid and sound syllogism based on a proverb (example (13)).

- (13) *Mapanga awiri abvumbwitsa*

[Trying to shelter from rain in two places at once can cause you to get soaked].

- (14) 1. One cannot take shelter in two places at once.  
 2. So, if one does not want to get soaked, then one needs to choose a single shelter.

3. A person does not want to get soaked, so s/he finds a single shelter.

A person can practically be found only in one place at a time. Trying to move from one shelter to another while it is raining can cause you to get soaked. This syllogism is sound in reasoning and valid in formulation as a hypothetical syllogism.

#### 4. Valid but Unsound Syllogisms

This type of syllogism has a valid formulation but uses unsound reasoning. Example (15) uses a situation selected from a conversation that occurred on a radio program. A caller believed that people should practice safe sex in order to live longer. An MPP syllogism can be crafted from this statement.

- (15) 1. To live longer, one needs to practice safe sex.
2. S/he has lived a long time.
3. So, s/he has been practicing safe sex.

Although the formulation appears valid, it does not make much sense that one needs only to practice safe sex to live longer, as the syllogism implies. People who practice safe sex may die from many other causes. Practicing safe sex may only be a part of living a long life. Thus, the syllogism does not employ sound reasoning.

#### 5. Uncogent but Strong Syllogisms

An argument is not always simply valid or invalid, sound or unsound. In some situations, an invalid argument contains premises that provide partial evidence supporting the conclusion. Such arguments are called 'strong.' The essential feature of a strong argument is that it is probable, but not necessary, that if its premises are true, then the conclusion is also true. A weak argument is one for which it is "not probable that if its premises are true, then its conclusion is true" (Layman, 2002: 37). A cogent argument is strong and has only true premises, whereas an uncogent argument is either weak or strong but contains at least one false premise (Layman, 2002).

Example (16) is a syllogism taken from a dialogue in a play written to encourage women who prefer simply to get married than to attend school.

- (16) 1. Men marry so that women can work for them.
2. Modern schools do not teach girls about marriage.
3. So, if I go to school, I will not get married.

Only the minor premise (statement 2) contains some truth. Thus, the syllogism is uncogent. Further, the conclusion does not follow directly from the two premises. An educated woman may be more desirable for marriage than one who did not go to school.



## 6. Cogent but Weak Syllogisms

Example (17) presents a cogent but weak syllogism taken from a novel. A character is worried that he will die of hunger because he has lost his employment.

- (17) 1. One needs to have the means of obtaining food for one's family.  
 2. I am not employed.  
 3. Thus, I cannot obtain food for the family.

The first two premises are true but the wrong conclusion has been drawn. Employment is not the only means of obtaining food for one's family. One could become a farmer and provide enough food for the family, or obtain food through several other means.

## FINDINGS AND DISCUSSION

A total of 545 syllogisms were formalized, including 219 from oral narratives, 122 from proverbs, 60 from ordinary conversations, 70 from the script of a play, and 74 from a novel.

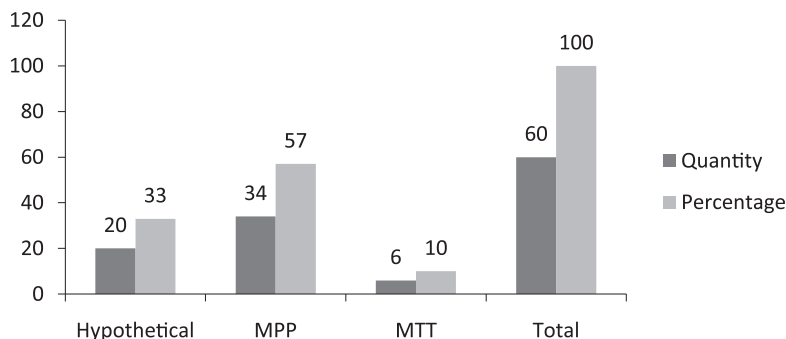
### I. Conversation

This genre was examined to explore the function of logic in everyday conversations. Conversations display individuals' oral skills in everyday human intercourse. Fig. 1 shows the findings of this study, grouped by major syllogism type.

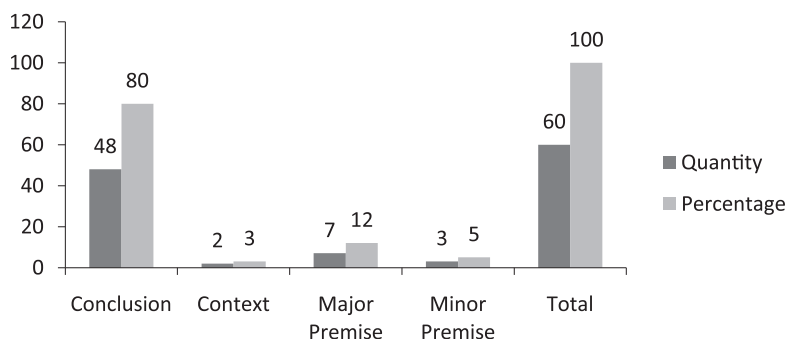
More than half of the arguments presented in conversation were MPP types. At this stage of analysis, the primary objective was to establish major argument patterns; the validity and soundness of the arguments was thus not assessed. Unlike MTT constructions, MPP arguments present a straightforward thought pattern that proceeds from premises to conclusion. MTT patterns do not seem straightforward and require time to construct, due to the aspect of negation. Given the limited time in which conversation participants may construct their arguments, it is reasonable that most arguments used straightforward and readily understood thought patterns. This finding does not mean, however, that simpler patterns of logic are used in conversations. The complexity of many arguments is revealed by the number of errors that are committed during spoken conversations.

About one-third of the arguments were hypothetical. Such arguments are based on hypotheses formulated by drawing on one's pool of knowledge and experience. Speakers usually hope that these hypotheses are found to be true. Thus, about one-third of the arguments presented in conversation are experiments that the speaker hopes will produce the desired results. The nature of the results is determined by the validity and cogency of the arguments.

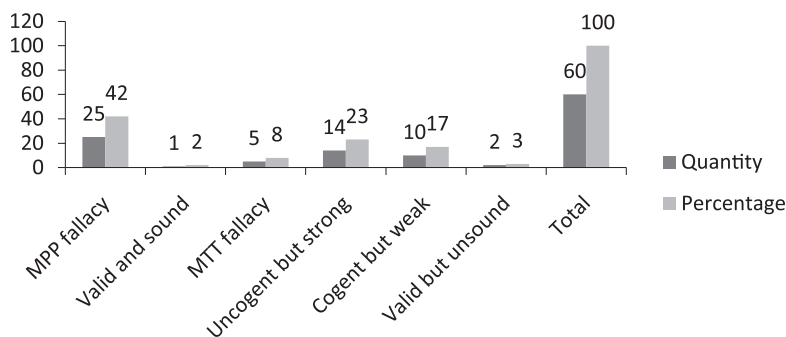
Fig. 2 presents the results according to syllogism content. This category was used to observe the manner in which arguments were presented in conversations. Like the analysis of major syllogism types (Fig. 1), which indicated that conversation participants frequently opted for easier constructions, the analysis of



**Fig. 1.** Major Syllogism Types—Conversations.



**Fig. 2.** Syllogism Content—Conversations.



**Fig. 3.** Assessment of Syllogisms—Conversations.

syllogism content found that 80% of arguments were presented or initiated simply as conclusions. It is ‘easier’ to simply present an argument as a conclusion, ignoring the premises. Participants infer the premises from the context of the conversation or discourse. The ‘easier’ (economical) way thus involves the abbreviation of the entire thought process, not the use of a simple pattern of logic or thought. Consequently, conversations were full of enthymemes (abbreviated syllogisms).

The assessment of syllogisms (Fig. 3) revealed more about human conversations. Only 2% of arguments were found to be valid and sound, and closer scrutiny would likely reduce this percentage. Thus, at least 98% of arguments contained

logical errors in reasoning. One might wonder how humans manage to communicate with so many errors in reasoning. These errors are complemented by calculated or implied probabilities taken from human experience; in other words, errors in reasoning are compensated for by the strength of arguments in conversations.

Accordingly, 5% of arguments were cogent and 23% were uncogent but strong. Humans thus depend on the cogency, rather than the validity and soundness, of arguments presented in conversation. The validity and soundness of arguments does not matter, as long as the likelihood of producing the desired results (the expected conclusion) is high. The 28% of arguments in Fig. 3 corresponds, in percentage, to the 33% of hypothetical arguments in the analysis of major syllogism types (Fig. 1). These findings strengthen the view that humans depend on experience-based knowledge when constructing arguments in conversation.

## II. Novels

The analysis of major syllogism types in the novel (Fig. 4) revealed that 44% of the crafted syllogisms were hypothetical, 34% were MPPs and 22% were MTTs. As in conversations, most arguments presented in the novel were based on human experience. Thus, nearly half of the arguments were hypothetical, regardless of whether they were valid or sound. Human experience, therefore, sets conditions under which some syllogisms are developed to justify human thoughts and actions. Example (18) presents a syllogism based on human experience.

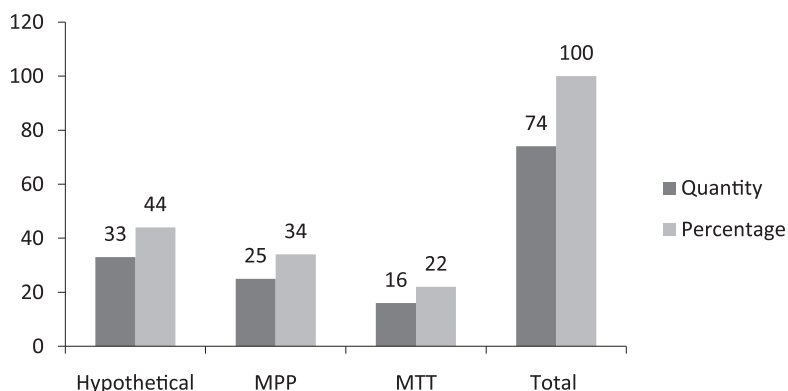
- (18) A prostitute will sleep with anybody, including those with an illness. If a prostitute sleeps with ill people, then she is also ill. So, if one sleeps with a prostitute, then one will contract an illness.

Syllogism (18) was derived from the belief that many prostitutes are carriers of sexually transmitted diseases, and that people who sleep with prostitutes have a high risk of contracting such diseases. Although the argument is invalid, it is strong because the probability of contracting a disease from a prostitute is high.

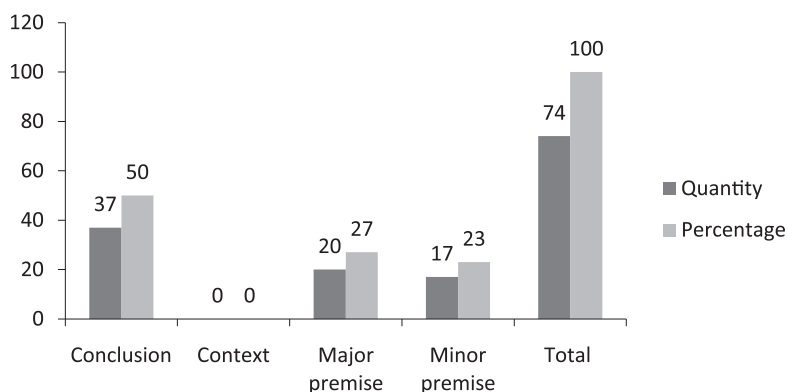
About one-third of the syllogisms were of the MPP type and about one-quarter were of the MTT type. As in conversations, the percentage of MTTs was lowest. Although this is a controlled environment, it is evident that people do not frequently question arguments using negation. In a negating statement, a speaker questions a situation in order to reorganize the premises of an argument and arrive at an appropriate conclusion. Example (19) presents an MTT syllogism.

- (19) If my husband loves me, he cannot leave me for another woman. He has not left me for another woman. So, he loves me.

The speaker negates the second statement, the consequent, and draws the conclusion that her husband loves her because he has not left her for another woman. Of course, the syllogisms in examples (18) and (19) are fallacies. The fact that the husband has not left his wife for another woman may have nothing to do with



**Fig. 4.** Major Syllogism Types—Novel.

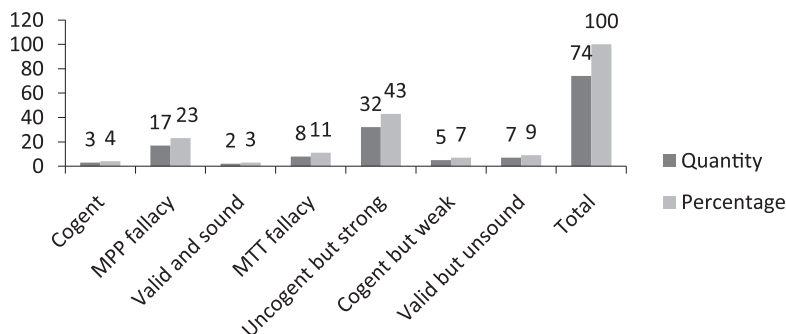


**Fig. 5.** Syllogism Content—Novel.

love, but may be due to other reasons, such as the children. The process of negation requires thought and time and, given that humans typically choose economical systems, it is logical that MTT was the least-used syllogism type.

As in conversations, syllogisms in the novel used conclusions as premises most frequently (Fig. 5). The results of analysis showed that 50% of the crafted syllogisms were presented or initiated in the form of conclusions. For instance, example (19) was presented only as a conclusion (“So he does love me”). The listener must construct the entire argument from the context of the discussion to arrive at the conclusion. Given that the novel is a microcosm of real life, it is logical that it used highly abbreviated syllogism patterns, as in conversation. The use of major and minor premises differed little in percentages. Because the novel provided sufficient context for the development of syllogisms, similar numbers of minor and major premises were presented without impairing logical thought.

The assessment of syllogisms in the novel revealed results similar to those for conversations (Fig. 6). Only 3% of the crafted syllogisms were found to be valid and sound. Even in a controlled environment, this situation is similar to that found for natural conversation. Although the remaining arguments were invalid, about half of them were strong. This further strengthens the assertion made earlier



**Fig. 6.** Assessment of Syllogisms—Novel.

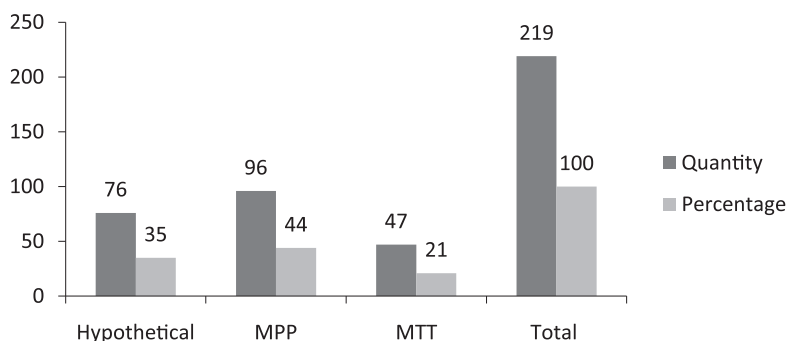
that human thought and, thereby, actions are generally based on the cogency, rather than the validity, of reasoning.

### III. Oral Narratives

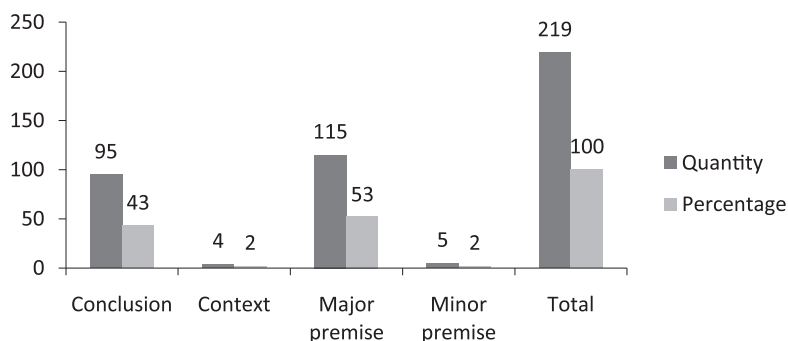
The oral narratives analyzed documented a type of folktale or folklore created by the Nyanja-speaking people of Eastern Province. They constitute the people's tradition and culture and are transmitted orally across generations. The folktales are thus generally considered to reflect the people's way of thinking. All syllogisms developed from the collected oral narratives can be said to reflect the general pattern of thinking (communal thought) of the Nyanja-speaking people, which is embedded in their culture. The analysis of major syllogism types produced results that were similar to those for the novel (Fig. 7). The occurrence of MTT types (21%) was nearly the same as in the novel. The pattern of occurrence of hypothetical and MPP syllogisms was the reverse of that found in the novel. Hypothetical syllogisms represented 35% and MPP types represented 44% of the arguments, whereas nearly the same percentages occurred in reverse order in the novel (Fig. 4). Thus, 35% of the arguments presented in the oral narratives were based on human experience, 44% were based on ordinary (straightforward but not easier) thinking, and 21% were based on critical thinking. As in other genres, critical thinking (MTT) occurred least often.

In oral narratives, the audience is given limited time in which to comprehend syllogisms. An audience comprises any individual(s) listening to a folktale at a given time. The narratives are thus designed to give the audience sufficient, although abbreviated, information in the form of premises to allow the desired arguments to be constructed. The use of the word 'desired' here implies the crafting of a syllogism that is generally expected, but is not necessarily valid and sound. Most syllogisms were presented in the form of major premises (Fig. 8).

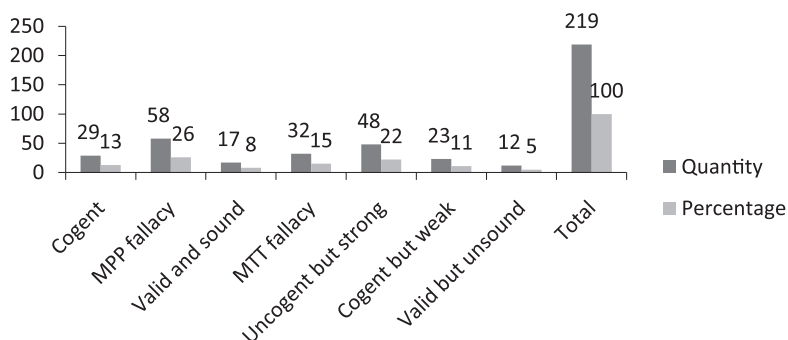
In comparison with a minor premise, a major premise provides a relatively large amount of information; this allows the person crafting a syllogism to approximate, as closely as possible, the desired syllogism. Thus, major premises accounted for 53% of syllogisms presented in oral narratives. Contexts are best regarded as major premises. About half (43%) of the arguments were presented as conclusions. Like conversations, oral narratives constitute a highly abbreviated system of logic



**Fig. 7.** Major Syllogism Types—Oral Narratives.



**Fig. 8.** Syllogism Content—Oral Narratives.



**Fig. 9.** Assessment of Syllogisms—Oral Narratives.

that uses many enthymemes. An enthymeme is “an argument in which one of the premises is not explicitly stated” (Oxford Dictionary of Philosophy, 2005: 116). It has also been defined as “an argument with an unstated premise or an unstated conclusion ... a syllogism complete in the mind and incomplete in expression” (Penguin Dictionary of Philosophy, 2005: 189–190).

Only 2% of the syllogisms were presented as minor premises. As explained above, this small percentage probably reflects the limited time available for the audience to craft or comprehend syllogisms from a given premise. In cases where a minor premise initiated an argument, the desired syllogism was immediately

obvious to an average audience. Any typical audience member would encounter little difficulty in comprehending such syllogisms. These syllogisms were not necessarily valid and sound, but represented traditional thought patterns.

The assessment of syllogisms in oral narrative (Fig. 9) found a higher percentage (8%) of valid and sound syllogisms than in the genres discussed above. This difference may be due to the communal nature of these syllogisms, which have benefitted from the concerted efforts of many narrators.

However, the analysis of oral narratives showed that even such communal thought contains many errors of reasoning. As in other genres, these syllogisms relied on cogency, rather than on validity and soundness. The strength of reasoning was based on human experience; 35% of the arguments were strong (22% uncogent but strong, 13% cogent; Fig. 9).

#### IV. Plays

A play is a controlled environment created to mimic real life. Analysis of the major syllogism types (Fig. 10) revealed that half of the arguments were MPP syllogisms and the other half were comprised equally of MTT and hypothetical arguments.

The argument pattern appeared to be influenced in part by the purpose of the play. The play was written to discourage popular beliefs, current at the time in which the play was set, about property grabbing from widows and the inheritance of widows by the brothers of the late husband. The play shows that the majority of people were in favor of these practices, although they were considered to be evil. Because MPP arguments are consistent with average thinking, it is logical that half of the syllogisms were of the MPP type.

The analysis of syllogism content revealed some behavioral similarities between the novel and the play (Fig. 11). This similarity can be attributed to two factors: both are controlled environments and both mimic real life.

Although the percentages are slightly different, the majority of syllogisms in the novel and the play were initiated by conclusions. This is a true imitation of real life, as observed in the analysis of conversations, which shows that logic

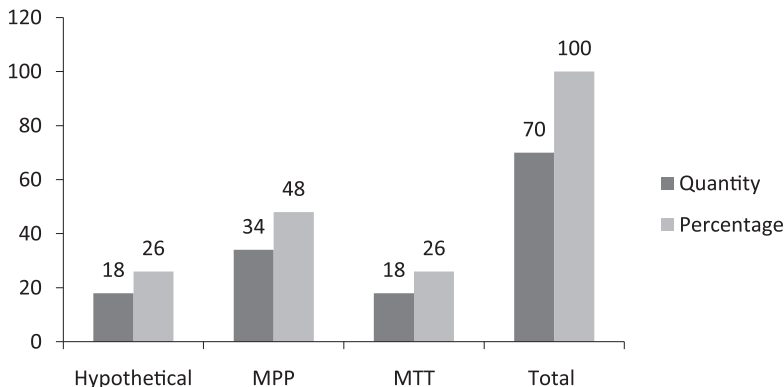


Fig. 10. Major Syllogism Types—Play.

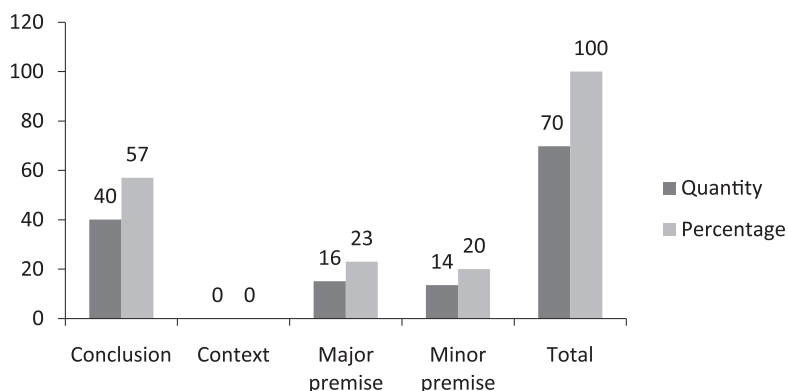


Fig. 11. Syllogism Content—Play.

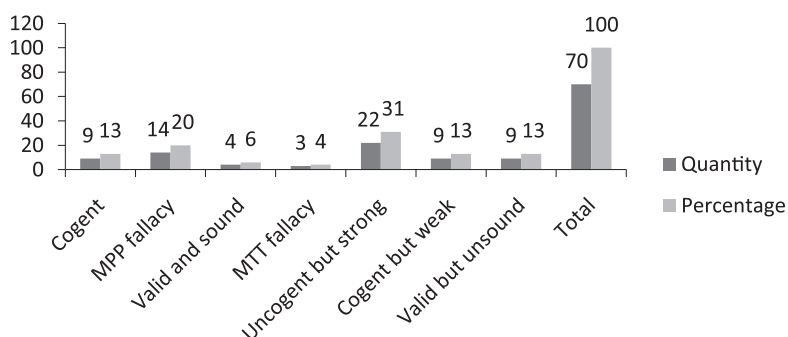


Fig. 12. Assessment of Syllogisms—Play.

was highly abbreviated. As in the novel, a high percentage of arguments in the play used minor premises because the context of the play provided the extra information needed to craft the desired syllogisms.

The assessment of syllogisms (Fig. 12) produced results similar to those for the genres discussed above. Thus, most of the previous discussion is also applicable to the play. The only difference is that good characters were ‘awarded’ strong syllogisms, whereas bad characters were ‘punished’ with weak syllogisms.

## V. Proverbs

Like oral narratives, proverbs are part of the folklore of the Nyanja-speaking people. They are embedded in the folklore and used as instruments of wisdom. Although proverbs have recently been documented in textual form, they have been disseminated largely through oral transmission throughout human history.

The distribution of syllogisms in the proverbs was similar to that in oral narratives, probably because both forms are traditional oral genres. The major syllogism types thus occurred with similar frequency (Fig. 13): 54% were MPP syllogisms, 26% were hypothetical and 20% were MTT syllogisms. The percentage of MTT syllogisms was relatively high because proverbs are used as a form of wisdom and education.



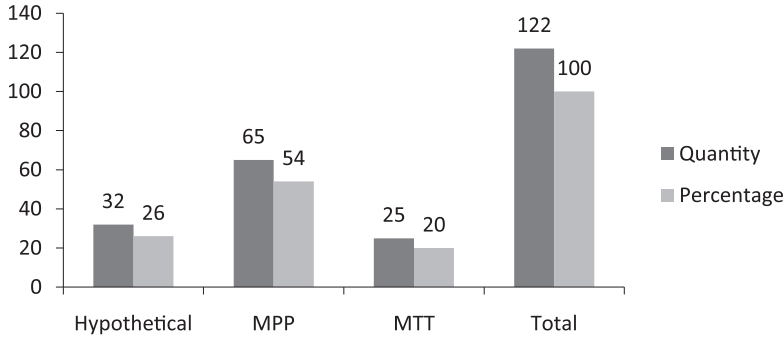


Fig 13. Major Syllogism Types—Proverbs.

As part of the oral narrative tradition, proverbs must also be comprehended within a short period of time. Thus, only 2% of arguments were presented using minor premises. Because proverbs require precise interpretation (i.e., the formalization of appropriate syllogisms), 64% were presented using major premises to give the audience sufficient information to craft syllogisms. About one-third (34%) were presented as conclusions. Thus, the proverbs also used an abbreviated system of logic.

Examples (20) and (21) are two Nyanja proverbs that can be formalized into two valid and sound syllogisms.

(20) *Mbalame ikakhala pauta siilasika*

[You cannot shoot a bird that sits on the arrow].

(21) *Cala cimodzi siciswa nsabwe*

[One finger cannot pick and smash lice].

The proverb in example (20) describes a situation in which a hunter goes into the bush to hunt birds with a bow and arrow. The hunter aims at a bird, but the bird takes flight and lands directly on the arrow. If the hunter shoots, the bird will fly away with the arrow. In this situation, it is practically impossible for the hunter to shoot the bird. On the surface, this situation relates to a real-life situation in which a judge (in traditional society, a traditional leader) commits an offence, and thus cannot preside over the case in which s/he is the defendant. Example (22) presents the formalization of this proverb as an MPP syllogism.

- |   |               |
|---|---------------|
| (22) 1. One cannot shoot a bird that sits on the arrow. | Major premise |
| 2. The bird is sitting on the arrow.                    | Minor premise |
| 3. Thus, the bird cannot be shot.                       | Conclusion    |

Thus, example (22) is initiated in a discussion using a major premise and the audience must craft the minor premise and conclusion. This allows the audience to participate actively in the formalization of an argument initiated by a speaker with a single statement, a major premise.

The proverb in example (21) describes a situation in which a person wants to

kill lice. Some families in poverty-stricken rural areas cannot afford to buy washing detergent, and lice can develop on the body or on clothes and bedding. Lice are irritating parasites that feed on human blood. It is also culturally embarrassing to be seen with lice, especially by members of the opposite sex, because lice are associated with dirt and an unclean lifestyle. Thus, one must pick and smash any lice one sees immediately. To kill a louse by hand, one must place it on top of the fingernail of one thumb and use the fingernail of the other thumb to smash it. It is thus impossible to smash lice using a single fingernail. This proverb applies to situations in which an individual, embarking on an enormous task, is advised to get help in order to accomplish the task.

Example (23) presents the formalization of this proverb as an MPP syllogism.

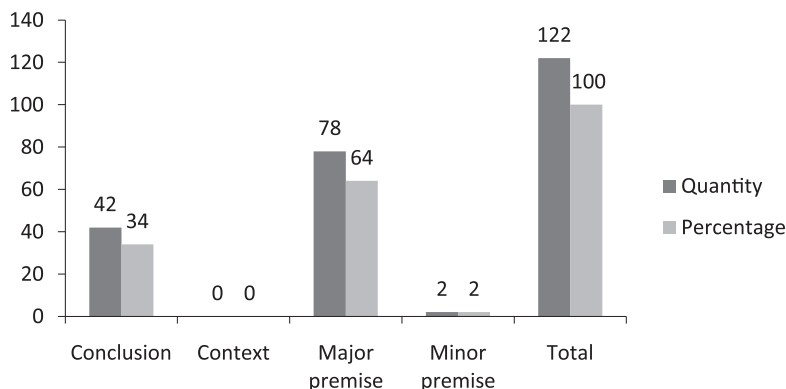
- |  |               |
|--|---------------|
| (23) 1. One cannot smash lice with one finger. | Major premise |
| 2. There is only one finger.                   | Minor premise |
| 3. So, lice cannot be smashed.                 | Conclusion    |

Like example (22), this syllogism is presented using a major premise. Proverbs are generally initiated using major premises (Fig. 14) for the same reasons that have been described for the other genres discussed. However, relatively more proverbs (64%) contain syllogisms initiated using major premises. This difference may be because the audience requires sufficient information to craft appropriate syllogisms. As a result, many of the proverbs examined consisted exclusively of major premises and 34% were conclusions. As part of the oral tradition, proverbs also used an abbreviated system of logic.

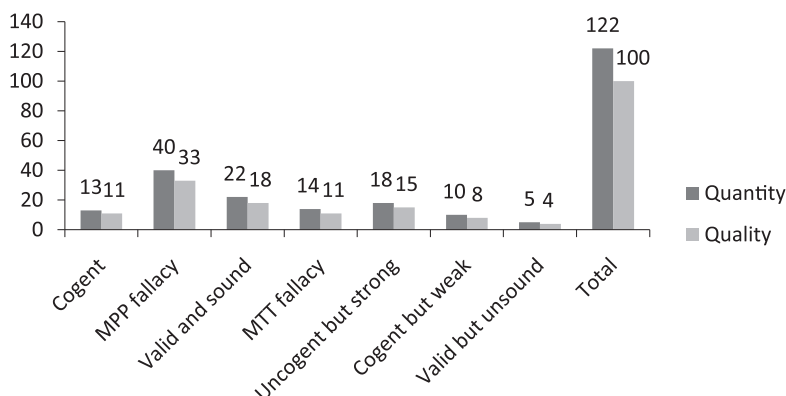
The assessment of syllogisms presented in proverbs (Fig. 15) revealed an interesting phenomenon. It is widely accepted in society that logic, ordinarily understood as intelligence, is the basis for wisdom. In logic, wisdom can be equated with the appropriate use of syllogisms. Thus, a wise person is expected to use syllogisms that are valid and sound to a greater degree than would an ordinary person.

Given the general understanding that wisdom is not common, one might expect that the percentage, overall, of valid and sound arguments would be lowest within this genre. In comparison with other genres, however, the proverbs contained the highest percentage (18%; more than double) of valid and sound syllogisms. It would seem, then, that proverbs truly represent the wisdom of the people. In addition, 26% of the syllogisms were strong. In total, 44% of the syllogisms had high values in terms of cogency, validity, and soundness. Valid and sound arguments were thus associated with a high level of intelligence, depending on the context of their use. The high number of valid, sound, and strong syllogisms can be attributed to the fact that proverbs are a product of collective wisdom and experience. Naturally, collective wisdom must supersede individual wisdom.

Proverbs are generally witty and thus captivate the audience's attention. They create a serious atmosphere in which the audience can craft desired and appropriate syllogisms. This is necessary because proverbs are usually unaccompanied by any form of explanation.



**Fig 14.** Syllogism Content—Proverbs.



**Fig 15.** Assessment of Syllogisms—Proverbs.

## CONCLUSION

About half (47%) of the 545 syllogisms that were crafted and analyzed were MPP syllogisms. MPP constructions were thus the most common syllogism type. Although this format does not necessarily represent the simplest form of thinking, it follows average Nyanja thought patterns. Of the three types discussed in this analysis, however, MPP arguments seem to be most readily formulated. MPP constructions are the product of many factors, including human experience and conditions.

Among all genres, 20% of the syllogisms were of the MTT type. This was the least popular type and has been observed to require more crafting effort. MTT constructions have been associated with above-average reasoning skills. Thus, elaborate reasoning is rare in humans. The MTT type can be considered a derivation of the MPP type.

Among all genres, 53% of the syllogisms were presented as conclusions, 37% used major premises (including context), and only 10% were presented using minor premises. Conclusions contain the least information and major premises contain the most. Generally, syllogisms were presented or initiated with little information or were abbreviated, and the remaining information was provided by

context and/or inferred from the presented premise.

In comparison with other genres, many more syllogisms were presented in conversations (80%) as conclusions. This finding is best regarded as characteristic of real life. Conversely, the lowest proportion of syllogisms presented in conversations used major premises (12% vs. 36% average). This pattern was also observed for proverbs, a form of folklore that also represents real life.

Among all genres, only 7% of syllogisms were valid and sound. Thus, most human communication (among Nyanja speakers) was based on logical errors in reasoning. This situation is compensated for by the occurrence of syllogisms whose strength (of probability) was derived primarily from human experience. About one-third (36%) of the syllogisms were strong, including cogent and uncogent but strong arguments.

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